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APARITY AMONG THE ORIBATIDAE (ACARINA)

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Aparity is that development in reproduction wherein the adult mother retains the eggs instead of laying them. The result is that the young hatch in the mother's body and are forced to feed on her tissues until they have eaten their way out. Such a condition might be construed as parasitism on the adult mother. Since the phenomenon is brought on by the parent and is forced upon the young, it can hardly be called parasitism, unless the old term obligate parasite is given a new meaning.

Although this phenomenon has already been recorded for *Sphaerozetes globulus* (1, p. 72), it was believed that the mother's tissues dried up and the young then hatched and escaped. It was also believed this was a winter condition. I have before me two individuals of *Galumna longipluma* one containing four full grown larvae, another three. In the case of the first, the sclerotized covers of the anal and genital aperatures, as also the labium closing the camerostome are still in place, as also the mouth parts. In the second individual the mouth parts and labium are gone, with the exception of one mandible which lies inside the body as if drawn in.

Another case is that of an *Achipteria punctatum* which contains two well grown larvae and an egg which is more coarsely granular than less advanced eggs, while the granules are of dissimilar sizes and shapes.

As the Galumna were taken July 29th and the Achipteria August 12th the condition is not hiemal. The parents have the appearance of having been dead when taken. I therefore infer that the parent dies about the time the eggs hatch. As the larvae must feed shortly after hatching, it is inevitable that they feed on the tissues of the mother. Moreover the larvae would have a very difficult time getting out if the tissues were dry and therefore hard. The larvae must cut through the tissues over and about the anal covers and/or labium and mouthparts (the genital aperature is too small for exit) in order to remove these structures. The anal covers can open outward only. Thus it seems logical to conclude that the parent dies by being eaten out by its progeny, which escapes through the camerostome.

As to the cause of aparity the following reflections are apropos: In the Galumninae one finds species with many eggs (to twenty-four in *Parakalumna robustum*) and others with as few as two (in *Zetes minutus* and *Galumna curvum=G. tantillum*). Usually the large species have many eggs and the small species have few. The size of the eggs in the subfamily increases as the species become more specialized. This means that in *Z. minutus* and *G. curvum* each egg occupies one-half of the abdomen. As the ovipositor and genital aperture retain the same proportion relative to the rest of the body, and as the body is so highly and completely sclerotized as to form a non-yielding aperture, the rela-

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tively huge eggs, in order to be evacuated, must be compressed to form a long tube or stay within the mother to hatch. Viviparity is known in this family at least in the intertidal genus Ameronothrus. Short of viviparity, aparity must result.

That this phenomenon has but rarely been observed is, in large part, due to the collecting method, which is, in brief, to drive the animals out of the moss and litter where they dwell, by heat. If the young are so far developed as to have caused the mother's death, the mother cannot walk out of her habitat and fall into the trap. There might be an intermediate stage where one young is hatched (the hatching seems to be progressive) and the mother is still able to move. Since such a stage has not been observed it would seem that the mother, as eggs reach their maximum size and press on the digestive organs, becomes inactive at an early stage of hatching.

Since the above was written, Willmann (*2*) has noted the same phenomenon in two tropical species.

LITERATURE CITED

1. Michael, Albert Davidson, 1884, British Oribatidae, Ray Society, Vol. 1.

2. Willmann, Carl, 1933, Oribatei (Acari), gesammelt von der Deutschen Limnologischen Sundra-Expedition. Nachtrag. 2; Archiv fur Hydrobiologie, Suppl.-Bd. XI "Tropische Binnengewasser, Band III". pp., 597-603, 3 figs.

A NEW SPECIES OF STAPHYLINUS (COL. STAPHYLINIDAE)

BY KENNETH W. COOPER,
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The species here described somewhat superficially resembles *Staphylinus cinnamopterus* Grav., yet appears distinct and to be hitherto uncharacterized. In admiration of Professor J. H. McGregor of Columbia University, and in appreciation of kindnesses tendered me, I propose to name this new form:

Staphylinus macgregori n. sp.

Habitus nearly as in *cinnamopterus* but larger in size and rather more robust; piceous, the elytra fusco-ferrugineus, the legs fulvo-ferrugineus; pubescence inclined, on the head, thorax, and elytra of a rusty hue and with few erect, brown setae, on abdomen fusco-piceous pubescence intermixing with fewer rusty-colored hairs and an abundance of dark setae; anterior tarsi broadly dilated in both sexes; head slightly narrower than prothorax, widest at basal fourth thence gradually narrowing anteriorly, hind angles obtusely prominent, punctures round and ocellate throughout, close-set but clearly separated by shining interspaces, sparser anteriorly; mandibles longer and more slender than in *cinnamopterus*, the two inner teeth much less prominent and more poorly developed; antennae piceous to fusco-piceous, a third longer than head; prothorax but slightly wider than head, truncate at apex, rounded at base, punctures ocellate, more elongate at the sides than those of head and somewhat larger, smaller and more closely set than in *cinnamopterus* but separated by shining interspaces, the median line evident, polished, but very narrow throughout, in places ill-defined or obliterated; scutellum velvety black; elytra fusco-ferrugineus, longer than wide, very finely but strongly and densely punctate, clothed with a decurved rusty-colored pubescence similar to that of head and thorax but more dense; abdomen obscurely fulvous at tip,

piceous, coriaceo-reticulate and very sparsely and finely punctate at sides, with median velvety fuliginous spots suffering intermixture of short cinereous hairs at the sides; under surface of abdomen clothed with sparse, long, depressed, fusco-piceous pubescence, coriaceo-reticulate, punctures very fine and sparse, slightly less sparsely distributed at sides of segments, the male fifth ventral with a very broad circular and feeble sinuation medially, the male sixth ventral obscurely fulvous at tip and with a broad, rounded, median emargination about one half as deep as long, fifth ventral of female truncate, sixth female ventral rounded evenly and fulvous. Length ( ) 10.0-12.7 mm.; width 3.0-3.3 mm.

Holotype—Male, Chiricahuae Mts., Arizona.

Paratypes—Male, Ramsey Canyon, Huachuca Mts., Arizona; female, Cochise, Arizona.

Male paratype in the collection of Mr. Charles A. Schaeffer, Curator of Entomology, Brooklyn Museum of Arts and Sciences; male holotype and female paratype in the author's collection.

It is evident that *macgregori* is related to *cinnamopterus* Grav., and should follow that species in a taxonomic catalogue. From *cinnamopterus* it differs in its pale rusty-colored legs, larger size, and radically different character of the apex of the male sixth ventral segment of the abdomen. In *cinnamopterus* the sixth ventral of the male has the median emargination smaller, triangular, and as deep as wide. *Cinnamopterus* has the punctation of the head and thorax of a much coarser character, with the ocellate punctures tending to elongation and at times appearing polygonal. Further, in this species the median smooth line of the prothorax becomes broader, much better defined, and tends to widen anteriorly, rarely if ever is the median smooth line interrupted; whereas *macgregori* is characterized by a narrow and somewhat ill-defined median line of the prothorax. It may be mentioned that these two forms also differ in characters of the undersurface of the head. In *macgregori* the undersurface of the head is much more finely and exceedingly sparsely punctate; *cinnamopterus* has the undersurface sparsely yet coarsely punctate. The gular sutures of *macgregori* are poorly defined, and approximate at the median third diverging narrowly at the posterior third. *Cinnamopterus* has the gular sutures separate throughout and more clearly formed.

NOTES ON TROPAEA LUNA, ACTIAS SELENE AND THEIR HYBRIDS (LEPID.)

BY HARRIET A. WICKWIRE AND ADELE CALALE,
Cortland, New York.

On the night of June 4, 1933, we "tied out" seven females of *Tropaea luna* and by 11 p. m. four of them had found mates.

On June 10 at 1.30 p. m., a male and a female *Actias selene* emerged from cocoons which we had purchased in New York. The following day two males emerged. Copulation occurred with one of these at 11.55 p. m. The mates separated at 2.30 the next morning and the female began ovipositing at once.

On June 16 at 1 a. m., two males of *Actias selene* went into copulation with two females of *Tropaea luna*. The following night one of these females laid eighteen ova and then died. The other female laid twenty-nine ova and died June 22.

The first *Tropaea luna* female which we mated to *Actias selene* had died without ovipositing. When examined after death, the abdomen of this moth was full of ripe ova. Perhaps the genitalia of *Actias selene*, being larger than that of *Tropaea luna*, injured the ovipositor during copulation.

Tropaea luna ova. Diameter 1½ mm. Coloration: variable, as described by Mr. Birdsong in the November 1932 issue of this magazine, and by us in the March 1933 issue. Duration of period: 8-16 days, commonly 14 days.

Actias selene ova. Diameter 3 mm. Ovoid and slightly flattened like *Tropaea luna* ova, coated with coffee-colored mammelian glue. Some shells showed a greenish cast under the coating. Duration of period: 8-13 days. The first ova deposited were not always the first to hatch.

Tropaea luna ♀ and *Actias selene* ♂, hybrid ova. In all cases the color was blue or bluish, but this might be by chance as *Tropaea luna* females have deposited blue ova when mated to their own species. The only brood of hybrids which hatched, did so in 12 days.

Tropaea luna, 1st instar. Form A. Head. Horn color with two wavy, dark brown lines crossing the face. Body. Pale yellow-green. Tubercles, setae, feet and props. Yellow-green. Dorsal tubercle on eighth abdominal segment is large but undivided.

Form B. Like Form A but having dark green lateral lines joined on first abdominal segment by a dark green dorsal patch.

In our breeding experiments Form A proved to be dominant and Form B recessive. Larvae were active. They rested with heads and thoracic segments turned to one side. Food plant: Hickory. Duration of instar: 8 days.

Actias selene, 1st instar. Length of larvae 12 mm. Head, feet and props. black. Plantae: Horn color. Prothorax, first to fifth abdominal segment and anal segment: Black. Other segments: Deep henna. The tubercles matched the segments on which they were found. There were dorsal, subspiracular, and lateral rows of black dots. Each of the tubercles was tipped with black and bore long horn-colored setae. The dorsal tubercle on the eighth abdominal segment was large but uncleft. Larvae were active. They rested with heads and thoracic segments turned to one side. Food plant: Witch-hazel. Recommended food plant: Sweet gum. One day they were given wild cherry by mistake and they ate it. Duration of instar: 4 days.

Tropaea luna ♀ and *Actias selene* ♂, hybrid larvae 1st instar. When the larvae hatched they were slightly longer than *Tropaea luna*. Head: Light olive-tan with olive-brown markings like *Tropaea luna*. Prothorax, first to fourth abdominal segment and anal segment: Olive-brown. Elsewhere the ground color was olive-tan. From the fourth to the eighth abdominal segment there was a lateral line of olive-brown, reminiscent of *Tropaea luna* Form B. Feet, props and anal shield: Olive-tan. The tubercles corresponded with the ground color of the segment on which they were found. The dorsal tubercle on the eighth abdominal segment was large but uncleft. Setae: Olive-tan. Dorsal line of dark spots present. Larvae were active. They rested with head and thorax turned to one side. One was seen to hang by silk when disturbed. Food plant: Witch-hazel. Duration of 1st instar: 6 days.

Tropaea luna, 2nd instar. Both forms alike. Head: Same as 1st instar. Body: Yellow-green with yellow tubercles and setae. Duration of instar: 3-5 days.

Actias selene, 2nd instar. Head, tubercles and feet: Black. Body: Rich red-henna. There were dorsal and lateral lines of black spots between the tubercles. Length of larvae at the end of instar: 20 mm. Duration of instar: 7 days.

Tropaea luna ♀ and *Actias selene* ♂, hybrid, larvae, 2nd instar. Head: Light tan with one dark wavy band across the face. Body: The color of maple sugar slightly burned. Tubercles: Pale at bases; subdorsal ones on second and third thoracic segments are large and darker than the others. Setae: Grayish. Duration of instar: 4 days.

Tropaea luna, 3rd instar. Head: Chestnut-brown. Body: Green. Tubercles: Purple or red; the subdorsal ones on the second and third thoracic segments were prominent. Anal shield marked as in illustration. Duration of instar: 10 days.

Actias selene, 3rd instar. Head and feet: Chestnut-brown. Body: Brilliant yellow-green. Subdorsal tubercles on second and third thoracic segments: Large and bright yellow banded with chestnut-brown at bases. All the other tubercles had chestnut-brown tips. The dorsal tubercle on the eighth abdominal segment was raised on a high green mound, but was no larger than the others. The anal shield was marked as in the illustration. Setae: Long and gray, irritating when touched. Spiracles: Red with yellow centers. Subspiracular ridge: Yellow. Length of larvae at the end of instar: 35 mm. Duration of instar: 7 days.

Tropaea luna ♀ and *Actias selene* ♂, hybrid larvae, 3rd instar. Head, feet and tubercles: Dark brown. Body: Pale maple brown with an undertone of green, changing to yellow-green after molting. Subdorsal tubercles on second and third thoracic segments no higher than others but redder. Dorsal tubercle on eighth abdominal segment, pink but not prominent. The other tubercles became yellow after the body color became green. The head and feet grew paler. Length of larvae at the end of instar: 30 mm. Duration of instar: 11 days.

Tropaea luna, 4th instar. No change in coloration. Length of larvae two days after molting: 50 mm. They ate the leaves and stems down to the woody twigs, cutting across the veins. Before this, they had skeletonized the leaves. They were active, fed day and night and rested on the twigs. Length of larvae at the end of instar: 55 mm. Duration of instar: 8 days.

Tropaea luna ♀ and *Actias selene* ♂, hybrid larvae, 4th instar. The only change in coloration was in the tubercles which became salmon-pink. The subdorsals on second and third thoracic segments were ringed with brown. Dorsal tubercle on the eighth abdominal segment was no more prominent than the others. Subspiracular ridge was yellow and prominent. Setae present but short. Length of larvae: 40 mm. Duration of instar: 6 days.

Tropaea luna, 5th instar. No difference in coloration or markings. Duration of instar before spinning: 9 days. Larvae became tan on dorsum before spinning.

Actias selene, 5th instar. Head: 8 mm. in diameter. The mound from which the dorsal tubercle of the eighth abdominal arose was enlarged and rough with granulations and setae. A faint, reddish, broken line bordered the yellow subspiracular ridge above. This line appeared from the first to the eighth abdominal segment. It was obliterated behind each spiracle, appearing on the next segment. There were no other changes and no changes were noted at spinning time. Length of mature larvae: 100 mm. or over. Duration of instar: 14 days.

Tropaea luna ♀ and *Actias selene* ♂, *hybrid larvae,* 5th instar. Tubercles elevated on mounds like *Actias selene* and about twice as high as those of *Tropaea luna.* Setae much longer than those of *Tropaea luna,* but not so long as those of *Actias selene.* No difference in coloration from the 4th instar. No difference in coloration at spinning time. Length of mature larvae: 70 mm. Duration of instar: 14 days.

Tropaea luna, cocoon. Length: 35-50 mm. Color of silk generally reddish tan. Cocoon spun in leaves unattached to stems. No opening.

Actias selene, cocoon. Length: 60-70 mm. Color of silk in purchased cocoons was reddish tan but in those which our larvae spun, the silk was white; otherwise the cocoons are like those of *Tropaea luna.*

Tropaea luna and *Actias selene, hybrid* cocoons. Length: 60 mm. Color of silk was white like *Actias selene.*

SOME NEW DYTISCIDAE (COLEOPTERA).

BY J. B. WALLIS,
Winnipeg, Manitoba.

In the course of the preparation of a paper on the Dytiscidae of Minnesota and Manitoba several new species were discovered. As this paper, though finished, cannot be published for some time, it is felt wise to make these species known and the opportunity to add a few others is taken.

Agabus minnesotensis sp. nov.

Holotype ♂.

Size. Length 10.5 mm., width 4.5 mm.

Shape. Feebly obovate, the greatest width being behind the middle of the elytra, rather broad.

Head. Entirely black, moderately shining, densely and finely punctulate, the punctules being generally connected by fine lines which rarely form a net work except basally and near the eyes. Appendages reddish testaceous.

Pronotum. Black with the rather wide marginal bead reddish, this colour

extending indefinitely a little along the basal margin. Sculpture very similar to that of the head anteriorly and medially, but with the lines forming a net work elsewhere.

Elytra. Black, somewhat aenescent, moderately shining, margins not rufescent, reticulate with a fine mesh-work in more than basal half, with many minute punctules on the engraved lines, and a few, still more minute, within the meshes. Apically, the engraved lines become rather coarser and deeper and the punctules on the lines disappear. A few of the extremely fine punctules within the meshes persist and in some of the areolae there appears an extremely fine system of secondary reticulation.

Underside. Piceous black, somewhat tinged with reddish, moderately shining. Legs nearly concolorous, the anterior pair slightly the lighter. Prosternal process moderately wide, its margins not expanded, sharply acuminate, metasternal groove long. Hind tibiae with a row of punctures along posterior margin. Inner apical spur of hind tibiae not longer than the basal joint of tarsus. Metasternal wings short, less than 1/3 the length of a coxal plate, the proportion being as 9:31.

Sexual Characters. Anterior and middle tarsal joints moderately dilated and clothed beneath with glandular hairs, flattened but not bearing distinct palettes. All the claws simple, rather slender and considerably curved; the front one of the anterior tarsi a trifle longer, and somewhat stouter, than its fellow; the claws of the middle tarsi a little longer than those of either of the other pairs. Last ventral moderately shining, sculptured with many fine lines and minute punctules much as are the coxal plates, with some coarse punctures apically on each side, but without any strigosities.

Type locality. Minnesota. Hennepin Co., Otto Lugger Collection. Type in the collection of the University of Minnesota. *Manitoba.* Not taken.

While it is usually undesirable to describe a species from a unique, this seems to be the correct course in the instance of this fine, distinct beetle. By its moderately convex prosternal process, not with expanded margins; the relatively short inner apical spur of the hind tibiae; the simple ♂ fore tarsal claws; hind tibiae with a row of punctures along their inner margins; large elytral reticulation; ♂ tarsal pads without distinct palettes this species runs to couplet 38 in H. C. Fall's key in "The N. A. Species of Agabus."

It is abundantly distinct from the black species, *gagates,* in that couplet, though evidently a near relative. It is considerably larger, less shining, a little more widened behind; its head is not rufescent, its pronotum very feebly so at sides, and its elytral margins not at all so. Its pronotal lateral beading is proportionally considerably wider than is that of *gagates.* Apically its elytral sculpture differs markedly from that of *gagates.*

Beneath it is less reddish, the prosternal process is much longer and much more sharply acuminate than in *gagates.* The front and middle tarsi are considerably more widely dilated and the claws of the front tarsi differ. In *minnesotenis* the posterior claw is not in the least sinuate and is evidently more slender than the anterior which is a little thickened basally and a trifle longer, but otherwise entirely unmodified. In *gagates,* too, the posterior claw is much more slender than the anterior but it is distinctly, though feebly, sinuate beneath and

the anterior also—although this is not mentioned by Dr. Fall—is narrower near the base then widening rather suddenly, this widening frequently being quite plainly, though feebly, angulate. The hind coxal plates in *minnesotensis* are proportionately much larger and much more arched anteriorly than in *gagates*, so that the distance between the plates and the middle coxae is actually less in the former than in the latter, while the anterior deflexed extremities of the metasternal wings are longer and narrower in *minnesotensis*.

Minnesotensis resembles *nigroaeneus* rather closely in general appearance, but its well developed metasternal sulcus—obsolete in *nigroaeneus*—, and its narrow metasternal wing — very much wider in *nigroaeneus*, separate the two species very easily.

Since the relative width and convexity of the prosternal process as used by Dr. Fall in his key must in some cases always be a matter of opinion, *minnesotensis* might conceivably be placed with *brevicollis*, *seriatus* and their allies where the prosternal process is considered to be rather broad and only moderately convex. It indeed shares several characters with this group, but on comparison the prosternal process is evidently narrower than in *brevicollis*, a species of about the same size. In any case there should be no confusion, the characters already given being ample for determination. As a ready means for separation, however, it may be pointed out that apparently the extraordinary type of reticulation of *minnesotensis* in which many of the lines appear to be chains of punctules, is unique.

Agabus audeni sp. nov.

Shape and Size. Slightly ovate, the greatest width about the middle of the elytra. Length 9.5 mm., width 5 mm.

Colour. Head and pronotum black, feebly aeneous, the anterior and basal margins of the head and the lateral margins of the pronotum feebly reddish. Elytra brownish fuscous, side margins and epipleura a little paler. Beneath black, hind margins of abdominal segments narrowly reddish. Fore and middle legs ferruginous, hind femora and tibiae piceous. Antennae and palpi rufous, not infuscate.

Sculpture. Head roughly reticulate, the meshes small but the engraved lines rather deep, not punctulate. Pronotum on disk reticulate with a little larger meshes but shallower lines and with rather numerous minute punctules, at the sides the sculpture is deeper and the meshes smaller so that it appears almost granulate. Subapical and subbasal bands of larger punctures well marked. Lateral beading narrow, the surface within somewhat swollen. Elytra reticulate with finely engraved, minute, irregular meshes, and with scattered fine punctules occupying the middle of some of the larger areolae, these more numerous apically. Each elytron with a few larger subsutural punctures, four rows of punctures, the third on, the fourth over the lateral declivity and rather numerous punctures close to the lateral edge apically. Beneath the usual strigillate sculpture is well marked, and the coxal plates and last ventral segment are particularly rough. Hind tibiae with a row of punctures along the inner edge.

Other Characters. Prosternal process rather long, narrow and flatly convex without expanding margins, pointed but not acuminate. Metasternal groove

well developed. Wings of metasternum narrow, scarcely one-third the width of a coxal plate.

Sexual Characters. Pro and meso-tarsi moderately dilated and with the glandular hairs furnished with fair sized palettes. Protarsal claws equal in length, and about as long as the claw joint, almost straight above before the rather abruptly curved point, the anterior scarcely visibly sinuate below, the posterior more evidently so.

Holotype. ♂, Okanagan, B. C., 13.X.13.

A perfectly distinct species, its convex, narrow prosternal process, its protarsal claws, its punctured hind femora, and its minute elytral reticulation taking it to couplet 35 in Mr. Fall's key. (N. A. Species of Agabus, page 8). It cannot possibly be mistaken for any of the species there given. It appears, indeed, to be a much closer relative of *congener* but the most casual examination would show marked differences, including the much shorter metasternal wing.

The species is named in memory of my kind correspondent, Kenneth F. Auden, whose untimely death robbed entomology of a promising devotee.

Ilybius denikei sp. nov.

Size—♂ Holotype, length 10 mm. Width 5.50 mm. ♀ Allotype, length 10.71 mm. Width 5.88 mm.

Shape—Oval, but slightly more obtuse in front. Convex, the shape being much as in *biguttulus*.

Colour—Above: black, slightly aeneous; front of head, sides of pronotum and of elytra quite broadly dark reddish; the anterior elytral spot well developed, long, the posterior small but distinct.

Below: Epipleura, hypomera, prosternum and appendages lighter red, except the middle and hind tarsi and to a lesser extent the hind tibiae, which are darker. Metasternum and abdomen piceous but somewhat infused with red, especially on posterior margins of abdominal segments.

Hind tibiae—Not coarsely punctured over one-half or more of their under surface.

Coxal plates—Moderately large, the distance between the plates and the middle coxae being a little less than one-third the length of a plate, a very close approximation being as 10:33.

Male Characters—Hind tarsal joints not margined externally; last ventral segment not carinate and with strigosities almost entirely absent, a few largish punctures along apical margin.

Female Characters—Last ventral very slightly, though quite broadly emarginate and with a narrow, short compressed plica.

Holotype and Allotype, Ingolf, Ontario, 16.VIII.25, W. N. Denike and J. B. Wallis, in my collection.

Paratypes, ♂ and ♀ over one hundred, all from same locality. Paratypes will be deposited in the Canadian National Museum, British Museum, A. M. N. H., U. S. Nat. Mus., Acad. of Nat. Science, Phila., Brooklyn Museum, University of Minnesota Collection and in the private collections of H. C. Fall, Chas. Liebeck, C. A. Frost, Ralph Hopping, Dr. A. Zimmermann, Munich, Germany; Dr. Guignot, Avignon, France.

This species is exceedingly close to *confusus* and almost as near to *fraterculus*.

Fraterculus appears not to be subject to reddish infuscation except its typical feebly reddish labrum and pronotal and elytral margins, and its spots are always small and very frequently one or both may be lacking. The coxal plates of *fraterculus* are smaller than in *denikei*, the proportion between the length of a metasternal wing and a coxal plate being almost exactly as 13.5:32. ♀ *fraterculus* may be at once separated from ♀ *denikei* or ♀ *confusus* by its deep, triangular, ventral emargination.

Denikei and *confusus* differ but little in the relative sizes of their hind coxal plates though those of *confusus* are a little the smaller, the proportions in the two species between the length of the metasternal wing and the length of a coxal plate being for *confusus* as 11:34 and in *denikei* as 10:33. This difference is so slight as to be of little value for comparative purposes. The ♂ fore tarsal claws differ slightly. In *confusus* the posterior is nearly as wide as the anterior while in *denikei* it is scarcely two-thirds the width. The ♀ ventral emargination is also strikingly similar though evidently more pronounced in *denikei*.

In fact there seems to be no very evident character to separate the species except colour and I would hesitate to describe it were it not for the very fine series available for study. This series seems to show not only that the small structural characters are constant but that the variation in colour is always away from *confusus*. In colour, indeed, *denikei* is quite striking, the reddish infuscation usually covering the whole head and frequently well up on the disks of the thorax and elytra. The frequently very elongate anterior elytral spot is quite out of the ordinary for the genus. Beneath, the red underside of the pronotum is not reproduced so far as I know, even in teneral *confusus*.

The species apparently is puzzlingly local in distribution all specimens having been taken within a few yards of a particular spot on Long Pine Lake near Ingolf, Ontario. At this point there is a small strip of sand near where a tiny rivulet flows from a swamp. The sandy bottom has patches of vegetable debris upon it and in this at a depth of water of from 2″ or 3″ to 1′ the beetles hide. Very careful search in other spots apparently identical and certainly very closely similar resulted in the capture of a number of *Ilybius* which to my surprise proved all to be *pleuriticus*.

It gives me pleasure to name this species in honour of my good friend and colleague, Mr. W. N. Denike of Winnipeg, who guided me to the spot where *denikei* was found and who has taken a number of them for me.

The North American species of the genus *Rhantus* are, I think, in an exceedingly confused condition, the *binotatus* section especially being little understood. The following species seems to be so evidently different from any recognized species that it can be made known without adding to the confusion.

Rhantus hoppingi sp. nov.

Holotype—♂.

Shape and Size—Oval, a little larger than the allied species, 12 mm. long, 6 mm. wide.

Head—Black above, with the anterior portion and a transverse rather narrow rectangular area on the vertex reddish yellow. Beneath black, the mouth parts and appendages reddish yellow, the palpi a little infuscate at tips, the antennae scarcely so. Above finely but densely sculptured with engraved lines and a few inconspicuous punctures.

Pronotum—Reddish yellow, feebly darkened along apical and basal margins in about medial third. Two rounded dark spots close together, one on each side of medial line in the middle of pronotum, another oval spot on each side placed obliquely about midway between the medial spot and the margin of the pronotum. Rather feebly margined, sculptured much as on head.

Elytra—Speckled as usual in the genus, but with the blackish dots predominating so that the general effect is dark, suture and scutellum dark. Outer half of basal margin largely a dingy yellow, lateral margins and epipleura dingy yellow from base to about the base of the first abdominal segment, thence quite abruptly dark. Sculpture of small areolae, the engraved lines fine, and a secondary system of minute areolae present, giving a rather dull effect.

Underside—Legs reddish yellow, not fuscate. Prosternal process and anterior portion of large side pieces reddish yellow, narrow front portion of prosternum blackish on each side of the process, posterior third of large side pieces black. Side margins of abdominal segments and apex of last ventral reddish yellow, coxal processes brown, remainder of underside black.

Sexual Characters—Protarsal claws short, much shorter than claw joint. Anterior claw abruptly sinuate so that the middle portion is considerably thicker than the basal or apical, posterior claw simply curved, not more than half as thick as the anterior and a little shorter.

Mesotarsal claws: Anterior longer than the protarsal claws, but little curved and not greatly thickened, though more than twice as thick as the posterior; the posterior claw rather more than one-half the length of the anterior, more curved and much thinner.

Metatarsal claws rather thin, the outer less than half the length of the inner.

Allotype—♀. Very similar to holotype, a little more strongly sculptured, and with a little paler elytra, the suture basally dingy yellow, the pale colour extending a short distance along the base of the elytra. The scutellum also reddish yellow in middle. Last ventral rather feebly strigate.

Outer metatarsal claw a trifle more than half the length of the inner. All claws rather long and slender, the posterior of protarsal pair a little shorter than its fellow.

Holotype—Trinity Valley, B. C., 26-29, VIII, 1929, J. R. L. Howell.

Allotype—Peachland, B. C., 7.VIII, 19. J. B. Wallis.

There are numerous paratypes from Trinity Valley bearing dates from 25.VIII to 15.IX, one ♂ from Peachland, B. C., 7.VIII.19, one from Malakwa, B. C., 1923, and two from Tuolumne, California, 25.VII.26.

In addition to the above, I have seen the species from Creston, B. C., G. Stace Smith, and from Pullman, Washington, O. Edwards.

Hoppingi must be very close to *gutticollis* Say, a species wrongly, in my opinion, placed as a synonym of *binotatus* Harris. Indeed, Say's description is,

as far as it goes, entirely correct for the new species. *Gutticollis,* however, was described from "the river beyond Vera Cruz," and such an extended distribution seems to be highly improbable. In addition, I have specimens of a species from Southern Arizona to which Say's description applies equally well, but which appears to be distinct from *hoppingi.*

There is considerable variation in the distinctness of the lateral pronotal spots. In some specimens they are reduced to scarcely more than an infuscation, typical, however, in position and size.

The dark stripe on the apical portion of the elytral margins is remarkably constant in length, but occasionally less dark than in the typical specimens where it is evidently darker than the adjacent portion of the elytra. Otherwise the specimens differ very little among themselves except in one important particular—the degree of the blackening of the side portions of the front part of the prosternum. In one or two instances this is scarcely more than an infuscation, in others the black is almost, if not quite, as deep as that of the posterior portion of the large side pieces. The colour of the elytra is lightest in the Peachland specimens. As in the allotype, several specimens show the suture basally and the scutellum in part yellowish.

It gives me pleasure again to recognize Mr. Ralph Hopping's distinguished contributions to our knowledge of the British Columbian aquatic coleoptera.

The European *bistriatus* has long been credited to our fauna, with *suturellus* Harris, as a synonym. More recently Dr. A. Zimmermann of Munich Germany, has assigned both these species to us.

That we have two closely allied species is evident and through the kindness of Dr. C. W. Johnston of the Boston Society of Natural History, it is established that *suturellus* Harris, is the species with evidently unequal ♂ protarsal claws. In that species, too, the legs are usually all reddish, the hind femora sometimes partly infuscate. The other species with ♂ protarsal claws nearly or quite equal in length has been considered to be *bistriatus* Bergst.

Through the kindness of Dr. Zimmermann, Dr. Franck, and Professor Ochs, all of Germany, I have a good series of *bistriatus* and I have no doubt that our species going under that name is distinct, and is described below:

Rhantus zimmermanni sp. nov.

Holotype—♂.

Size—Length, 10 mm. Width 5.5 mm.

Shape—Oval, a little more parallel sided than *suturellus,* the greatest width just behind the middle of the elytra; not very convex.

Head—Reddish testaceous in front, this area somewhat triangular, its caudal margins running obliquely inward from just in front of the eyes, and connected by a triangular projection at the apex with a bilobed transverse vertex spot, remainder of head pitchy black; sculptured with a multitude of fine lines interspersed with a few punctules; appendages reddish testaceous, the last joint of the palpi and the outer joints of the antennae infuscate at tips.

Pronotum—Reddish testaceous, with a medial black crossbar on the anterior margin, widest at middle, and a basal black crossbar nearly one-third the depth of the pronotum in medial half, abruptly, but not very sharply, narrowed at each end of this wide portion but traceable to side margins; densely sculptured with fine

vermiculate lines, practically without punctures except in the anterior black bar and at the sides near the base.

Elytra—Reddish testaceous, densely irrorate with black except at sides and a line on each side of the narrow black sutural stripe.

Underside—Black, with the epipleura, hypomera, prosternal process, prosternum and the anterior half of the large side pieces reddish testaceous; front legs entirely reddish testaceous, middle femora feebly clouded with piceous, hind femora and coxal processes piceous. Last ventral finely but rather sharply strigate on each side. Metasternal wing a little longer than in *suturellus*.

Sexual Characters—Fore tarsal claws long, nearly equal, the anterior just visibly the longer; nearly straight when seen from above and the posterior considerably wider than the anterior. Anterior midtarsal claw broad, rounded on upper, nearly straight on lower edge with a sharp downward curved point, the posterior about three-quarters the length of the anterior, of the usual shape and moderately curved. Both mid-tarsal claws a little shorter and stouter than in *suturellus*. Genitalia almost as in *suturellus*.

Allotype—♀, differs from the holotype only by the sexual characters and by having its elytra a little less densely irrorate with black.

Holotype—Winnipeg, Manitoba 10.V.28.

Allotype—Winnipeg, 2.VI.28.

There are numerous paratypes from as far east as Bradore Bay and Natashquan, Quebec, to as far west as Copper Mountain, B. C. Paratypes will be deposited in the Canadian National Collection, American Museum of Natural History, U. S. National Museum, British Museum, University of Minnesota Museum and various private collections.

On the whole there is remarkably little variation in this species. The anterior protarsal claw varies slightly in length, being sometimes almost exactly as long as the posterior, sometimes just perceptibly longer. Northern specimens are subject to considerable extension of the black markings on the pronotum and legs, a fine series taken by Mr. W. J. Brown along the north shore of the St. Lawrence in Quebec showing this tendency splendidly. In the extreme cases the apical and basal pronotal black margins, especially the basal, widen and extend at their full width almost or quite to the lateral margins. Also the piceous black markings of the legs extend to the middle and hind tibiae, and even to the hind tarsi.

Many females of this species show to a greater or less degree the type of sculpture exhibited by *suturellus* var *subopacus* Mannk, but in my opinion the form is so completely connected by intergrades with the usual type of sculpture, which is similar to the male, that even a varietal name is unnecessary.

This species and *suturellus* Harris, have each been called *bistriatus* in American Collections. Whether or not *bistriatus* Bergst. does occur on this continent cannot be considered absolutely settled, but the examination of several hundred specimens from the Atlantic to the Pacific coasts has not revealed anything but *suturellus* and *zimmermanni*. On the whole it appears to me that *bistriatus* should be deleted from our lists.

Either *suturellus* or *zimmermanni* can easily be mistaken for *bistriatus* as the three species are much alike. *Bistriatus* in its typical form can be told from

the other two by the colour of its pronotum which is testaceous, with basal margin narrowly black or immaculate, and the apical margin usually immaculate, rarely very narrowly black. (Scholz. Col. Centralblatt II, 1927, p. 142-5). Both our species have the basal pronotal margin rather broadly black and the apical more narrowly, but still distinctly blackish. Occasionally *bistriatus* has its pronotum as strongly marked as the less well marked specimens of the other species. There are other points of difference among the three, however, and these are summarized below:

Bistriatus. Anterior protarsal claw ♂ thicker and usually a little shorter than the posterior. Aedoeagus longer than in our species, and the parameres with much longer hair. Legs reddish testaceous, rarely infuscate.

Zimmermanni. Anterior protarsal claw ♂ straight, a trifle longer or equal to and not as thick as the posterior. Hind femora piceous and frequently all the legs more or less dark.

Suturellus. Anterior protarsal claw ♂ sinuate, thicker and one-eighth longer than the posterior. All legs reddish testaceous, the hind femora occasionally infuscate.

I dedicate the new species to Dr. Alois Zimmermann to whose generosity I owe many European specimens, and to whose work on the *Dytiscidae* all interested in the family are greatly indebted.

Our species of the genus *Graphoderes* are, like those in *Rhantus*, little understood, but at present I shall be content with a brief discussion of the section of the genus characterized by the posterior black pronotal band always attaining the hind margin and the anterior pronotal band usually attaining the front margin. The following species is new.

Graphoderes manitobensis sp. nov.

Shape—Oblong-oval, almost evenly narrowed before and behind, the width at the humeri very nearly as wide as the elytral width at the corresponding distance from the anal end, moderately convex.

Head—Reddish-yellow, maculate as usual with black.

Pronotum—Reddish-yellow, with a wide anterior black band reaching the front but not the side margins and a black basal band, wide at the middle, narrow at each side, reaching both the basal margin and the sides.

Elytra—Black, irrorate with yellow, and with yellowish sutural and side margins as usual.

Underside—Reddish-yellow. Metasternal wing about one-tenth the length of the coxal plate.

Legs—Fore tarsi with 29 smaller and 3 larger disks. Middle tarsi with 28 disks arranged in four fairly regular rows. Claws of fore tarsi bent rather more; anterior claw of middle tarsi rather wider, shorter, and less curved than in allied species.

Size—Length 14 mm., width 8 mm.

Holotype ♂. Winnipeg, Manitoba, 21.VI.1911.

Horn considered *fasciatocollis* Harr. to be identical with *cinereus* Linn., a conclusion with which Dr. Zimmermann agreed. It is certainly true that these two species as well as *manitobensis* are exceedingly close, but unless this latter

is a freak, of which it gives no sign, we are assuredly dealing with three distinct species, with *cinereus,* in all probability, not occurring in our fauna.

The differences between *fasciatocollis* and *cinereus* as tabulated by Dr. Sharp are: that the former is: "A little narrower in front, and the anterior border of the hind coxae is not quite so approximate to the middle coxal cavity; the male has less numerous palettes on the front and middle tarsi, and the peculiar sexual punctures of the female is quite wanting in *D. cinereus.*" (Op. cit. p. 693.)

The two former of these differences are a little difficult to use, as, while true, there is some variation in the shape of the insects and in the length of the metasternal wings, but the two latter differences seem to hold absolutely, though there is not always exactly the same number of palettes on the tarsi. I have not, however, seen a *fasciatocollis* with fourteen palettes on the middle tarsi, nor with more than twenty-four on the fore tarsi.

A rather striking character which I believe has not hitherto been pointed out is in the relative length of the hind femora and tibiae. In *cinereus* the femur reaches the posterior margin of the 5th abdominal segment and the tibia projects a little past the end of the last segment, while in *fasciatocollis* and in *manitobensis* the femora and tibiae are evidently shorter, the femur not reaching the posterior margin of the 5th and the tibia not quite reaching the end of the body.

The claws of *cinereus* ♂ are much, though not exactly like those of *fasciatocollis,* but those of *manitobensis* differ from either. The genitalia of the three species show decided differences.

I have a good series of *cinereus* from France and Germany, thanks to my kind correspondents, Dr. Guignot, Dr. Zimmermann and Professor Ochs, and judging from it, Dr. Sharp's statement that the anterior black pronotal band always reaches the front margin is true. It is by no means the case in *fasciatocollis,* however, as in quite 20 per cent of that species there is a more or less definite narrow reddish band between the black and the margin.

For convenience I tabulate the important characters of the three species.

Fasciatocollis	Cinereus	Manitobensis
More strongly narrowed in front than in *cinereus.*	Oval, moderately narrowed in front.	Almost evenly oblong oval. Scarcely perceptibly wider behind.
Palettes of ♂ fore tarsi, 23, 3.	Palettes of ♂ fore tarsi, 28, 3.	Palettes of ♂ fore tarsi 29, 3.
Palettes of ♂ middle tarsi, 4, 4, 4, in two rows.	Palettes of ♂ middle tarsi, 6, 4, 4, in two rows.	Palettes of ♂ middle tarsi 28 in four rows.
Anterior tarsal claws ♂ moderately bent, shorter than in *cinereus.*	Anterior tarsal claws ♂, moderately bent.	Anterior tarsal claws ♂ more strongly bent.
Anterior claws of middle tarsi ♂ about as long as *cinereus,* as narrow, but straighter.	Anterior claw of middle tarsi ♂ longer, narrower and more bent.	Anterior claw of middle tarsi ♂ shorter, wider, straighter.
Hind femora and tibiae shorter than in *cinereus.* ♀ elytra with deep punctures.	Hind femora and tibiae longer than in *manitobensis.* ♀ elytra without deep punctures.	Hind femora and tibiae shorter than in *cinereus.* ♀ unknown.
Metasternal wing longer than in *cinereus.*	Metasternal wing longer than in *manitobensis.* About 2/15 the length of the hind coxal plate.	Metasternal wing short, about 1/10 the length of the hind coxal plate.

Including *occidentalis*, our three species with basal pronotal band always, and apical pronotal band usually, attaining margins, may be separated thus:—

1. Midtarsi of male not dilated ..... *occidentalis*
   Midtarsi of male dilated 2
2. Protarsal palettes in number, 3 larger and about 23 smaller, midtarsal palettes, 12 in two rows..... *fasciatocollis*
   Protarsal palettes, 3 larger and 29 smaller, midtarsal palettes, 28 in four rows ..... *manitobensis*

NEW EPHEMEROPTERA FROM THE GASPE PENINSULA*

BY J. MCDUNNOUGH,
Ottawa, Ontario.

The summer of 1933 was spent by Mr. W. J. Brown of the Dominion Entomological Branch in insect faunal survey work on the Gaspe Peninsula, his camp being located on the slopes of Mt. Lyall, near the headwaters of the Cascapedia river, at an altitude of about 1500 ft. A small but very interesting collection of Ephemeroptera was secured, comprising *Blasturus nebulosus* Wlk., *Leptophlebia adoptiva* McD., *Leptophlebia debilis* Wlk., *Ephemerella aurivillii* Bngsstn.; *Baetis vagans* McD., *Iron pleuralis* Banks and *Iron gracilis* Morg. There were further three undescribed species taken which very clearly link up the Ephemerid species of the Gaspe peninsula with those of the Rocky Mountain region; of one of these the nymphal association was discovered. I describe these species as follows.

Ameletus browni n. sp.

Belongs, according to color of male abdomen and type of genitalia, in a group with *dissitus* Eaton and *cooki* McD.

Male. Head and thorax deep mahogany-brown, the mesonotum broadly light yellow-brown along the median line; some pale areas extending obliquely forward and downward from bases of wings and around the bases of the legs. Abdomen dorsally rather deep yellow with narrow brown rings on posterior edge of each segment which broaden out laterally into rather poorly defined brown triangular patches, the apices almost attaining the anterior margin of segment. Ventrally slightly paler yellow with a central row of oval brown spots on first seven segments and faint ruddy brown shading along the lateral margin. Forceps and setae faintly smoky, the latter with fine dark intersegmental rings. Legs yellowish, the femora tinged with ruddy-brown, especially the fore-femur which is considerably darker than the others. Wings hyaline, with a very faint amber tinge, most noticeable in the basal costal area; veins and crossveins fine, brown, except the costal crossveins before the bulla which are indistinct.

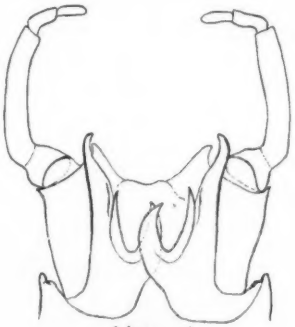
Female. Head dull ochreous, shaded broadly in the median area behind the antennae with ruddy brown; thorax rather lighter brown than in male with less yellowish shading on mesonotum; abdomen entirely deep purple-brown, due probably to underlying egg-masses; anal plate slightly notched at tip. Legs duller than in male, pale brown with the femora strongly shaded with purple-brown. Wings as in male but without any amber tinges. Length of body, 9 mm.; of

*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

forewings, ♂, 8 mm., ♀, 10 mm.

Subimago male. Suffused with smoky over the colors of the male imago; wings rather deep smoky.

Nymph. Head, thorax, and abdomen light sepia-brown. On the head there are small whitish areas between and behind the antennae and the mouth parts are pale. The pronotum has a pale median band, pale lunate submedian and lateral streaks, enclosing a pale spot on anterior margin. Mesothorax has following pale marks:—a fine medio-dorsal line broadening into a patch at posterior margin; two pairs of subdorsal streaks, the posterior pair coalescing to form an H-shaped mark; several curved marks at bases of wing pads. Metathorax has a broad pale median band flanked by oblique pale streaks. The pale abdominal maculation of segments I-IX consists of a broad median band, slightly broken at anterior and posterior margins of segment and bordered by a faint dark spot in central portion of segment; a pair of white submedian dots in centre of segment and another pair in antero-lateral angle; a slightly oblique bent streak along lateral margin, leaving a dark shade in postero-lateral angle. Segment X is whitish with a pair of dark submedian streaks based on anterior margin. Ventrally pale brown with traces of a whitish medio-dorsal line, a pair of small subdorsal dark streaks and a dark dot, tipped with white, in antero-lateral angle; lateral margin whitish. Setae blackish for the basal three-quarters, then white with a very fine dark tip. Legs pale; coxa with a strong dark lateral bar; femur with faint dark median band and dark tip; tibia proximally and tarsus both proximally and distally tipped with dark. Gills rather small (especially first pair) oval, whitish, with fine darker edge but no visible tracheation



A.browni

Holotype—♂, Mt. Lyall, Gaspe Co., Que., Aug. 11, (W. J. Brown) bred from nymph); No. 3652 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—1 ♂, 1 ♂ subimago, same data; 1 ♀, Aug. 14; also 2 ♂, 1 ♀, (bred material in alcohol), Aug. 10, 11, 14, and 1 ♂ (captured) Aug. 12.

The male genitalia differ decidedly, as a reference to the figure will show, from those of *cooki* in the shape of the stimuli.

Rhithrogena gaspeensis n. sp.

Male. Head deep brown, shaded with blackish around the ocelli; thorax deep pitch-brown, paler brown on the mesopleura, anterior to wing bases. Abdo-

men dull brown, slightly paler hyaline on the anterior segments near intersegmental area but without any definite maculation. Setae deep smoky. Legs dull brown, femora with a central longitudinal blackish streak. Wings hyaline with fine brown veins and crossveins and a very faint brownish tinge at extreme base of wing.

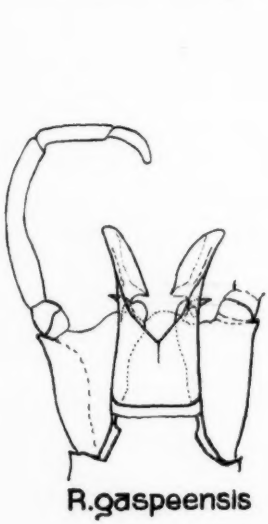
Female. Head brown, slightly paler along borders of eyes and tinged with smoky anteriorly. Coloration of remainder of body much as in the male. Length of body 11 mm.; of forewings 11-12 mm.

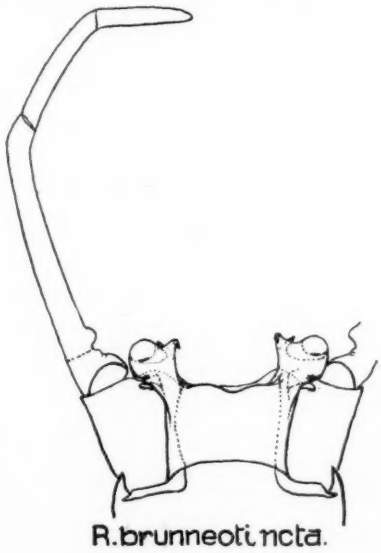
Holotype—♂, Mt. Lyall, Gaspe Co., Que., Aug. 9, (W. J. Brown); No. 3653 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—24 ♂, 12 ♀, same data, Aug. 8-10.

The species belongs in the *doddsi-morrisoni* group, according to male genitalia, showing the presence of a lateral spine on each penis-lobe. From the former species it differs in that the penis-lobes are much more narrowed apically and bend gently and evenly outward; there is further no trace of any other spining on either dorsal or ventral surfaces; in *morrisoni* the lobes are broader apically and more excurved and there is a very distinct, although small, spine on the inner ventral surface of each lobe.





Rhithrogena brunneotincta n. sp.

Male. Head brown, shaded with paler in the antennal region. Thorax deep pitch-brown with a slight paler brown shade on mesonotum before the scutellum; mesopleura and bases of legs shaded with ochreous brown and with a ruddy shade anterior to base of forewing. Abdomen dorsally deep brown with the lateral edge and small triangular areas on latero anterior and posterior margins lighter olive-brown; on the anterior segments the intersegmental area is also narrowly paler, giving a slightly ringed appearance; ventrally lighter olive-

brown deepening to brown on posterior segments. Forceps and setae deep smoky. Forelegs deep smoky with slight olive tinge on femora; mid and hind legs more olive brown with slight smoky shading on femora and tarsi. Wings hyaline, *distinctly tinted with brownish amber* on basal two-thirds of forewings and costal half of hindwings. Veins and crossveins fairly strong, brown, the crossveins of the pterostigmatic region being thickest, the costal ones not appreciably anastomosing, as is usual in the genus.

Female. Much as in the male; forelegs somewhat paler and shading on wing not quite so deep. Head rather bright brown with paler, ochreous shading in the antennal region and the anterior edge suffused with smoky. Anal plate short and rather squarely truncate. Length of body, 12 mm.; of the wing, 13 mm.

Holotype—♂, Mt. Lyall, Gaspe Co., Que., June 28, (W. J. Brown); No. 3654 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, July 4.

Paratypes—1 ♂, 3 ♀, same data, June 28, July 3; 2 ♀ (in alcohol), July 5.

I also have before me a male which appears to belong here from Glen House, N. H., collected by C. W. Johnson on June 15, 1911.

Obviously related to the western *robusta* Dodds, according to male genitalia, and differing only in minor details of the spining of the penis-lobes; in the present species the inner apical spine of each lobe is dorsally recurved and the apex of the lobe itself is not so squarely truncate; the lateral spining is also somewhate different. The brown-shaded adult wings render the species easily recognizable.

NEW COLEOPTERA FROM WESTERN CANADA IV.*

BY RALPH HOPPING,
Vernon, B. C.

ALLECULIDAE.

Genus **Pseudocistela** Cr.

Check list of the Coleoptera, Salem, 108, 1873.
Cistela Fab., of LeConte and Horn Classification.
Chromatia Lec., Smith, Misc. Coll., III, 244, 1861.

Crotch, in his Check List of the Coleoptera, 1873, substitutes the name *Pseudocistela* Cr. for *Cistela* Fab. of the LeConte and Horn Classification. There seems to have been a doubt about Mulsant's genus *Gonodera* according to Leng, (Jour. N. Y. Ent. Soc., XXVI, 209, 1918) who says "the genus *Gonodera* Muls. Col. Cr. Pectin, 1856, may cover our species and if so would antedate Crotch's name." As we have not been able to see a specimen of the genus *Gonodera,* we are using the above name. Casey, (Annals N. Y. Acad. Sci., VI, 73, 1891), in his key, groups *Pseudocistela* with the genus *Androchirus* as having anterior tarsi "compressed and distorted" in the males. The genus *Pseudocistela,* however, does not (except *brevis* which has a slight distortion in the male) have the anterior tarsi compressed and distorted, but normal. Col. Casey's use of the word "distorted" instead of "deformed," used by LeConte and Horn seems advisable.

In general similarity of form, some members of the genus strongly resemble *Androchirus* but may be separated by the following characters:—

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*Contribution from the Division of Forest Insects, Entomological Branch, Department of Agriculture, Ottawa, Ont.

Males with last ventral not emarginate (except *brevis*) antennae serrate.

Males with the last ventral emarginate, antennae not serrate, filiform.

A. erythropus does not seem to have the male anterior tarsal joint flattened and distorted as in *A. femoralis,* but on account of the similarity of the last ventral abdominal segment, it seems best to leave it in this genus for the present. Other characters separating the genera do not seem to hold true, as the mandibles are more or less variable, and the hind coxae in both have longitudinal grooves.

We have before us the material of the U. S. National Museum, Canadian National Collection, Calif. Academy of Sciences, (including Dr. Van Dyke's and Dr. Blaisdell's collections) our own large series, especially of Californian and British Columbian material, and two smaller collections belonging to Mr. Hugh B. Leech of Salmon Arm, B. C., and Mr. G. Stace-Smith of Creston, B. C.

The sexes can usually be easily distinguished by the comparative length of the antennae, the second and third antennal segments shorter in the male and the distal segments much shorter in the female. The length of the antennae, however, varies within the species.

The difference in length between the second and third antennal segments is less in the male than the female. In *opaca, amoena* and *brevis,* these two segments are nearly equal in length in the male, while the third is at least twice the length of the second in the female. In *pacifica, marginata, pinguis* and *pectinata,* the third is much longer than the second in both sexes. The penis, when extruded, has a long sharp spine about 1/3 mm. from the apex in *pacifica* and *opaca* which seems to be lacking in other species. The last ventral does not differ much in the sexes except in *brevis.* The female last ventral is more or less concave toward the apex in *pacifica, opaca, brevis* and *pectinata,* but not in *marginata* and *amoena.* Probably the males of *brevis* are the most aberrant in the genus with their deeply excavated last ventral.

The relation of the length to the width of the prothorax seems to vary with the sexes and forms an unreliable character for the separation of the species. Col. Casey's very careful description of the then known species need not be repeated; however, the few minor details in which they appear to be incorrect are herein mentioned.

Another unreliable character is the width of the elytral interspaces.

KEY TO THE SPECIES OF PSEUDOCISTELA.

A. Antennae of both sexes serrate; form stout (except *opaca*); comparatively small species, 5-10 mm.

B. Pronotum with basal margin nearly straight and basal angles right; anterior intercoxal piece linear; prothorax rufous; head and pronotum rather sparsely, finely punctured; legs short. 1. *amoena* Say

BB. Pronotum with basal margin bisinuate and basal angles acute; anterior intercoxal piece broad; legs long.

C. Males with last ventral deeply emarginate; form short and robust; legs rufous; Eastern species. 2. *brevis* Say

CC. Males with last ventral not emarginate; Western species.

D. Elytral striae shallow; interspaces flat; terminal segment of maxillary palpi more than twice as long as wide, margin not angulated, cylindrical. 3. *pinguis* Lec.

DD. Elytral striae rather deeply impressed, interspaces convex.
E. Third antennal segment two or more times as long as the second in both sexes; terminal segment of maxillary palpi more than twice as long as wide, obtusely angulated near the base; form short and stout. 4. *pacifica* n. sp.
EE. Third antennal segment slightly longer than the second in the male, approximately twice as long in the female; terminal segment of maxillary palpi not more than twice as long as wide, angulate at the middle; form elongate. 5. *opaca* Lec.
AA. Antennae of males with distal extremities of segments produced, approaching subpectinate; females serrate with segments 4-11 more than twice as long as wide; form elongate, large species, 10-13 mm.
B. Basal angles of pronotum acute; pronotal and elytral margins testaceous; disc of elytra opaque black; striae faintly impressed with interspaces almost flat; Eastern species. 6. *marginata* Ziegl.
BB. Basal angles of pronotum almost right, not acute; elytra entirely piceous, faintly shining; striae strongly impressed and interspaces convex, Western species. 7. *pectinata* n. sp.

1. *P. amoena* Say. Jour. Acad. Phila. III, 268, 1823 (Chromatia).

Length 5-7 mm. The only specimens we have seen of this species were from Indiana, Ohio and Texas. It is the smallest of the known species, oval and flatter than any other, shining with flavous to rufous body and prothorax. The elytra are piceous, sometimes margined with a narrow rufous band.

The small size and sparse punctation compared with the dense punctation of the other species easily distinguishes it. We cannot find sufficient characters of generic value to separate this species from *Pseudocistela*. Two males and three females are before us.

2. *P. brevis* Say. Jour. Acad. Phila. III, 269, 1823.
erythroptera Ziegl. Proc. Acad. Phila. II. 46, 1844.
rufipes Melsh. Cat. No. 518.

Length 8-9 mm. The twenty-six specimens of both sexes which are before us all have red legs, although we have not much doubt that black-legged specimens may be found. Two specimens in the collection of the U. S. Nat. Museum and two in Dr. Van Dyke's collection have light brown elytra. The species seems to be entirely eastern and is easily recognized by its short, robust form and strongly convex elytral intervals, with the males with the last ventral deeply emarginate. In the last character it more nearly approaches the genus *Androchirus* but has the serrate antennae and short form of many of the *Pseudocistelas*. Eastern Canada and Eastern United States.

3. *P. pinguis* Lec., Smith, Cont. Knowl. XI, 16, 1859 (Xystropus).

Length 8-10 mm. This species seems to be almost unknown in collections. The Leng check list gives its habitat as Kansas, but the type locality is New Mexico. We have before us seven specimens, one of which is from New Mexico, five from the Lake Tahoe region of California and one from Siskiyou Co., Calif. Since the Tahoe region is on the western edge of the Great Basin this distribution is not remarkable, as species found in Arizona and New Mexico are often found in the sage brush areas of south central British Columbia.

The species seems to be characterized by the flat elytral interspaces with striae not, or scarcely at all, impressed, the generally less convex form, and the cylindrical maxillary palpi. The only male seen is from Lake Tahoe, Calif. It

has antennal segments 7-10 strongly serrate and the terminal joint exceedingly long.

4. **P. pacifica** n. sp.

Length 7-10 mm. Piceous throughout, shining; form short and stout; convex, more nearly resembling *brevis* in form than any other species.

Head with punctation of front fine and very close but the punctures distinctly separated; eyes rather deeply emarginate; antennae with segment 3 over twice the length of 2; terminal joint of maxillary palpi elongate, angulated basally.

Pronotum finely and densely punctured; basal angles acute; basal margin bisinuate; margins evenly arcuate from base to apex.

Elytra with striae rather deeply impressed and distinctly punctate; interspaces with punctation dense, convex; lateral margins sharply reflexed.

Ventral surface not densely punctured on the abdomen, legs black, shining.

Female differs in the slightly wider and flatter interspaces, greater length of the third segment of the antennae and slightly concave last ventral segment.

Holotype, ♂, Vernon, B. C., VI-17-1922, R. Hopping, No. 3266 in the Canadian National Collection.

Allotype, ♀, Vernon, B. C. VI-9-1924, R. Hopping, No. 3266 in the Canadian National Collection.

Paratypes 14, 10 ♂♂, 4♀♀, from Vernon and Salmon Arm, B. C., in the Canadian National Collection, U. S. National Museum, Academy of Sciences of San Francisco, and the author's collection. Thirty-four specimens are before us, all from British Columbia except one from California, a female which we are unable to separate. It bears the label "Huckleberry Meadow, 6500 Ft., Fresno Co., Calif., July, 1912," collected by Ralph Hopping.

P. pacifica differs from *brevis* by not having the last ventral of the male emarginate, and by the third segment of the antennae much longer, and the females in the colour of the legs and antennae, black instead of red. From *opaca* it differs in the much greater length of the third segment of the antennae in both sexes and the relatively shorter, more robust form.

5. *P. opaca* Lec. Proc. Acad. Phila. 78, 1859.

thevenettii Horn. Trans. Amer. Ent. Soc. V 156, 1875.

Length 6-9 mm. Of the 144 specimens of this species before me, 65 have red legs and 79 have black legs. Casey says that all the specimens of *opaca* before him seemed to be females and as he does not describe the female of *thevenettii* in all probability he had only males. All specimens sent me as *thevenettii* have also been males with red legs. Although the females with black legs seem more common than the females with red legs, I have before me both males and females of each colour form and cannot separate them except as to colour of the legs. Males of each are equally slender.

Of 15 specimens taken at Oak Flat, Fresno Co., Calif., in 1909, 11 have red legs (4♂, 7♀) and 4 have black legs (1♂, 3♀). Of a series of 26 taken in the Sierra National Forest on June 20, 1927, 10 have red legs (3♂, 7♀) and 16 black legs (4♂, 12♀).

This species is quite commonly taken on various species of *Ceanothus* when in flower, and may quite easily be told by its elongate form compared with

pacifica and *brevis* and from *pinguis* by the impressed striae and convex intervals. Of the very large series before us, all are from California.

6. *P. marginata* Ziegl. Proc. Acad. Phila. II, 46, 1844.

Length 10-13 mm. Five specimens are before us of both sexes. The very long form, large size, testaceous prothorax with disc of pronotum black, elytra margined with a narrow testaceous band, and males with anterior of antennal segments produced, distinguish this species from any other, especially its nearest ally, *P. pestinata*, which is entirely piceous and more convex, although the antennal segments are produced in the same manner.

7. **P. pectinata** n. sp.

Length 10-11 mm. Entirely black, slightly shining; form elongate, ovate and convex.

Head with front densely and finely punctate; eyes large and emarginate; antennae with segments 4-10 with the apices more or less produced laterally, giving the appearance of being subpectinate; terminal segment of maxillary palpi twice as long as wide.

Pronotum densely punctate; basal margin bisinuate; basal angles almost right, not acute; sides gradually rounded to apex.

Elytra with striae rather deeply impressed and evidently punctured; interspaces notably convex.

Ventral surface evenly, finely punctured.

Female with antennae serrate, segments 4-11 more than twice as long as wide.

Holotype, ♂, bearing the labels 17131, Lot 45, Midday Valley, Merritt, B.C., VI-26-1925, W. G. Mathers, *Pinus ponderosa*. No. 3265 in the Canadian National Collection.

Paratypes, 5 ♂ ♂, four bearing same labels as the holotype with the exception of the lot numbers which are 40-41-172-178. The fifth bears the label Midday Valley, Merritt, B. C., VII-4-1922, N. L. Cutler.

Paratypes in the Canadian National Collection, Academy of Sciences of San Francisco, U. S. National Museum, and the collection of the author.

This looks like an enlarged *P. opaca* but differs greatly in the structure of the male antennae, the segments being produced, the third segment much longer than the second, and in the female by the distal segments being more than twice as long as wide, whereas in the females of *opaca* the distal segments are short, less than twice as long as wide. Consequently the difference in the length of antennae between the females is greater in proportion.

REFERENCES.

Pseudocistela (*Cistela*).

Pettit, J.—List of Coleop. of Grimsby, Ont. Can. Ent. Vol. II, 1870, p. 131.

Bethune, Rev. C. J. S.—Coleop. of North Part of Br. Am., Can. Ent., Vol. V, 1873, p. 210.

Holland, W. J.—Fauna Bor. Amer. Vol. XX, 1888, p. 89.

Horn, G. H.—Synonymy of Coleop. Can. Ent. Vol. VIII, 1876, p. 190.

Henshaw, S.—Det. of 36 Coleop. Descr. by D. Zeigler, Can. Ent. Vol. XVII, 1885, p. 131.

Hamilton, J.—Notes on Coleop. Can. Ent. Vol. XXIII, 1891, p. 60.

Hamilton, J.—List of Coleop. taken at Sparrow Lake, Ont. Can. Ent. Vol. XXV, 1893, p. 324.

Leng, C. W.—Notes on some changes in List of Coleop. Jour. of N. Y. Ent. Soc., Vol. XXVI, 1918, p. 209.

Fall, H. C.—List of Coleop. of S. California, Occ. Papers Acad. Sci. Vol. VIII, 1901, p. 177.

Chagnon, G.—Prelim. List of the Insects of Prov. Quebec, Part III, Coleop. p. 248.

LeConte, J. L. and Horn—Classif. of Coleop. 1883, p. 390.

Hopping, R.—Notes on Coleop. found on Species of Ceanothus., Ent. News. Vol. X, No. 6, p. 165.

Alleculidae (*Cistelidae*).

Horn, G. H.—Coleop. of Baja Calif. 1894, p. 353.

Schaeffer, G.—New Coleop. and Misc. Notes Jour. N. Y. Ent. Soc., Vol. XIX, p. 125.

Fall, H. C. and Cockerell, T. D. A.—The Coleop. of New Mexico,, Trans. Amer. Ent. Soc. Vol. XXXIII, p. 205.

Fall, H. C.—List of Coleop. of S. Calif. Occ. Papers Calif. Acad. of Sci., Vol. VIII, p. 175.

Chagnon, G.—Prelim. List of Insects of Prov. Quebec, Part III, 1917, p. 248.

LeConte, J. L. and Horn, G. H.—Classif. of Coleop. 1883, p. 389.

LeConte, J. L.—Smith Misc. Coll. XI, No. 167, 2nd Ed. 1866, p. 64.

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